

Q1.

```
In[63]:= x0 = 0;
x1 = 2.0;
Nmax = 20;
eps = 0.0001;

f[x_] := Cos[x];

(* --- Regula Falsi Method --- *)
If[N[f[x0]]*N[f[x1]] > 0,
  Print[],

  For[i = 1, i ≤ Nmax, i++,

    x2 = N[x1 - f[x1] * (x1 - x0)/(f[x1] - f[x0])];

    If[Abs[x1 - x0] < eps,
      Return[
        Print[, N[x2]];
        Print[, i, , N[x1 - x0]];
      ]
    ];

    Print[i, , N[x2]];
    Print[, i, , N[x1 - x0]];

    If[f[x2]*f[x1] > 0,
      x1 = x2,
      x0 = x2
    ];
  ];

  Print[, N[x2]];
  Print[, i, , N[x1 - x0]];
]

(* --- Plot the Function --- *)
Print[];
Plot[f[x], {x, -1, 3}]
```

1 th iterations value is : 1.41228

Estimated error in 1 th iteration is : 2.

2 th iterations value is : 1.57391

Estimated error in 2 th iteration is : 0.587717

3 th iterations value is : 1.57078

Estimated error in 3 th iteration is : 0.161623

4 th iterations value is : 1.5708

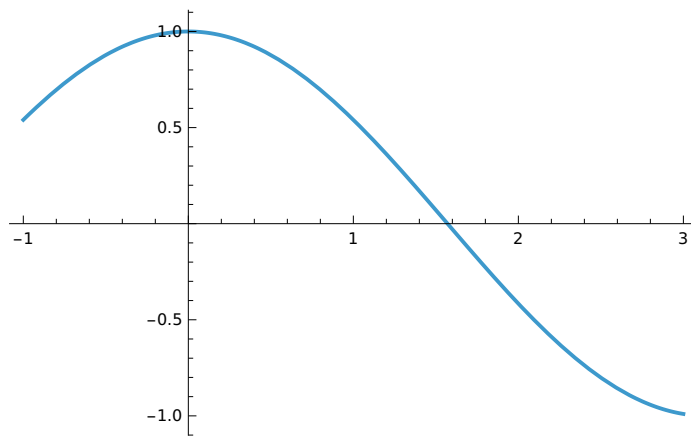
Estimated error in 4 th iteration is : 0.0031228

Root is :1.5708

Estimated error in 5 th iteration is : 0.0000128049

Plot of $f[x]$:

Out[70]=



Q2

```

In[71]:= (* --- Input Values --- *)
x0 = 0;
x1 = 2.0;
Nmax = 20;
eps = 0.0001;

f[x_] := Cos[x] - x (E ^ x);

(* --- Regula Falsi Method --- *)
If[N[f[x0]]*N[f[x1]] > 0,
Print[],

For[i = 1, i ≤ Nmax, i++,

x2 = N[x1 - f[x1] * (x1 - x0)/(f[x1] - f[x0])];

If[Abs[x1 - x0] < eps,
Return[
Print[, N[x2]];
Print[, i, , N[x1 - x0]];
]
];

Print[i, , N[x2]];
Print[, i, , N[x1 - x0]];

If[f[x2]*f[x1] > 0,
x1 = x2,
x0 = x2
];
];

Print[, N[x2]];
Print[, i, , N[x1 - x0]];
]

(* --- Plot the Function --- *)
Print[];
Plot[f[x], {x, -1, 3}]

1 th iterations value is : 0.123501
Estimated error in 1 th iteration is : 2.

```

2 th iterations value is : 0.223208
Estimated error in 2 th iteration is : 1.8765
3 th iterations value is : 0.30105
Estimated error in 3 th iteration is : 1.77679
4 th iterations value is : 0.360215
Estimated error in 4 th iteration is : 1.69895
5 th iterations value is : 0.404262
Estimated error in 5 th iteration is : 1.63979
6 th iterations value is : 0.436544
Estimated error in 6 th iteration is : 1.59574
7 th iterations value is : 0.459931
Estimated error in 7 th iteration is : 1.56346
8 th iterations value is : 0.47673
Estimated error in 8 th iteration is : 1.54007
9 th iterations value is : 0.488724
Estimated error in 9 th iteration is : 1.52327
10 th iterations value is : 0.497249
Estimated error in 10 th iteration is : 1.51128
11 th iterations value is : 0.50329
Estimated error in 11 th iteration is : 1.50275
12 th iterations value is : 0.507561
Estimated error in 12 th iteration is : 1.49671
13 th iterations value is : 0.510576
Estimated error in 13 th iteration is : 1.49244
14 th iterations value is : 0.512701
Estimated error in 14 th iteration is : 1.48942
15 th iterations value is : 0.514199
Estimated error in 15 th iteration is : 1.4873
16 th iterations value is : 0.515254
Estimated error in 16 th iteration is : 1.4858
17 th iterations value is : 0.515996
Estimated error in 17 th iteration is : 1.48475
18 th iterations value is : 0.516518
Estimated error in 18 th iteration is : 1.484
19 th iterations value is : 0.516886
Estimated error in 19 th iteration is : 1.48348

20 th iterations value is : 0.517144

Estimated error in 20 th iteration is : 1.48311

Root is :0.517144

Estimated error in 21 th iteration is : 1.48286

Plot of $f[x]$:

Out[78]=

